MAIZE GENETICS COOPERATION

NEWS LETTER

7

September 13, 1934

Department of Plant Breeding
Cornell University
Ithaca, N. Y.

MAIZE GENETICS COÖPERATION
DEPARTMENT OF PLANT BREEDING
CORNELL UNIVERSITY
ITHACA, NEW YORK

V7

Vol. 7 September 13, 1934

To Maize Geneticists :-

We have the pleasure to announce that the Rockefeller Foundation has made a grant to support the cooperative maize work for a period of five years. We are indebted to Brink for having suggested to the Rockefeller people that they aid in a financial way the cooperative maize genetics enterprise.

Last fall we issued for the first time a call for news items such as new linkages, linkage data, short accounts of specific problems, new genes, etc. The response and interest manifested was sufficient to warrant the issuing of a similar call this fall. We would like to have the different items by November 15th. This time limit should make it possible to obtain seedling counts this fall before sending in your news items. The listing of new genetic testers is desired so that we can keep the list of available maize stocks up to date.

In addition to serving as a distributing and cooperative bureau this laboratory shall attempt to collect and maintain stocks of all corn characters. With this purpose in mind, this past summer we grew 8000 plants in our gardens and over 2000 pollinations were made. Included in this collection were characters which had not been grown in recent years, and were in danger of being lost, as well as desirable stocks which had become depleted through calls for seed. The great majority of the pollinations were made by Mr. John Shafer, a graduate student here at Cornell. While our primary purpose shall be to preserve the genes which have previously been isolated, we hope to produce, in a limited manner at least, some desirable multiple combinations.

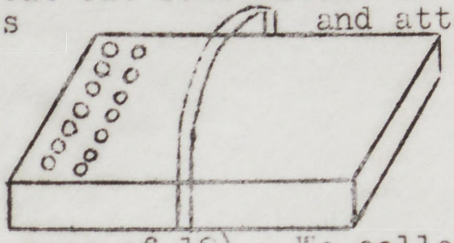
Since January, 1934 this laboratory has distributed on request over 350 stocks to different investigators.

Through the kindness of R. G. Wiggans we have secured a dozen inbreds which are fairly early in season and are very resistant to the strains of corn smut present at Ithaca. Since some of our genetic testers are extremely susceptible it seems advisable to cross them with resistant lines to obtain resistant testers. In order to determine which of the inbreds will prove best we shall send samples of seed of the different inbreds to several stations so that their smut resistance in different parts of the country can be tested. Those inbreds which are most resistant will then be used in crosses with the susceptible genetic testers.

It is becoming increasingly more important to have lists of cytological testers, i.e., strains in which the chromosome morphology is known. Those of you who are engaged in cytogenetic research please go over your material to see if you can furnish such information and, if so, send us the lists.

Pollen classification

Anderson sends the following concerning classification of pollen for semi-sterility, etc. "We cut out some blocks of light redwood, bored holes in them like this



and attached handles. Usually we have 96 holes (8 rows of 12). We collect pollen only in the forenoon. No tags are used. We write the family number on the block and then check the plants collected in the record book, skipping a hole as we pass from one family to the next for safety. The pollen sheds plentifully especially after an hour or more. Tapping the tassel over a slide gives lots of pollen which we look at dry. When pollen is plentiful it is easier to classify dry than in a KI-I preparation. You get used to shriveled pollen after a while so it doesn't bother much. If it is too shriveled we put on a drop of weak iodine solution."

Anderson states that his assistant has made as many as 800 classifications in a single day.

Leitz makes a small pocket microscope (Tauschen Mikroskop) which sells for about $14.00. This pocket microscope can be used in classifying pollen in the field. It is a very fast and convenient method but can be used only when the anthers are shedding pollen. On a quiet morning, however, it is possible to work for several hours before the pollen has been completely shed.

Induced mutants

Stadler has kindly furnished this laboratory with the following mutants which he obtained in his X-ray work. We increased these stocks this past summer and they are available for distribution to anyone wishing to study their linkage relations.

Segregating mutant	Viability	Linkage indication
Argentia (ar_a)	good	close to su
dwarf (d_b)	good	none
dwarf (d_a)	good	slight - Y repulsion

yellow green (yg_a)	low	none
pale green (pg_a) (might = ar_a)	good	close to su
virescent (low ratio)	probably fair	none
virescent (v_a) (not induced)	good	none
glossy (gl_b)	fair	none
glossy (gl_c)	fair	none
fine streaked (fi_a)	good	none
glossy (gl_d)	lethal	none
pale green	possibly viable	none
pale green (wilts)	very low	close to Y
pale green	lethal	20 units from Y

The names and symbols given to these mutants are merely for convenient reference. When they have been more thoroughly tested names and symbols will be assigned to them.

Maize genetics in the U.S.S.R.

American maize geneticists will be glad to learn that an active group of workers in maize genetics is springing up in the U.S.S.R. This work is under the direction of M. I. Hadjinov. We have received the following letters from him which are transcribed here for your information.

"Your letter of November 13, 1933 I received only 13th January, 1934. I am enclosing herewith information about our works on the maize genetics. I hope it will be of some value though strongly delayed.

During the last 2-3 years we have carried out this work some results of which will be shortly published. The greater part of them I am sending you today.

I should be much obliged if you would kindly send me the mimeographed circulars of the Cornell University on maize genetics and also some genetics stocks.

I should like to ask you if you would find it possible to send me also numbers of circulars previously years of which I possess only that of 1930 "Linkage in Maize".

I wish to state that I am familiar with the Chromosome Map in the report of Prof. R. A. Emerson on the VIth Genetic Congress.

Dr. G. D. Karpetchenko asks me to send his best wishes to you.

Yours sincerely,

(Signed) M. I. Hadjinov."

The enclosure:

"Recurrences of known mutations

liguleless. From 7 stocks: Shanghai, Primosky Region (F. East) 2 different stocks, Middle Volga region, Armenia, U.S.A. Leaming (all tested) and one from the N. Caucasus (non-tested).

ramosa. From 4 stocks: Italy, 2 different stocks of Georgia, N. America (tested).

shrunken. From 2 stocks: Middle Asia, North America (varieties Minnesota 23) (tested).

golden$_1$. From West China (tested).

green striped. From 2 stocks: Georgia, Leaming (non-tested).

Teopod. From early sugar varieties (names unknown) supplied by Prof. Larionow from Ukraine, where Teopod has never been grown before.

fine-striped. From 2 stocks: Mexico, N. America (tested).

anther ear. From 2 stocks N. America (non-tested).

dwarf$_1$. From 2 stocks (tested).

dwarf$_3$. From 1 stock (tested).

barren-sterile. (Prof. Hayes). From Spain (non-tested).

barren-stalk. (Prof. Emerson). From Italy (non-tested).

tassel seed$_1$. From 2 stocks. Primorsky Region, N. America (tested).

tassel seed$_2$. From 2 stocks. Georgia, Armenia (tested).

lazy culm. From Ivory King (N. America) (non-tested).

brown midrib. From 2 stocks: Georgia, Sterling (N. America) (non-tested).

4 cases of cytoplasmatic male sterility: Azerbaijan, Peru, N. Caucasus, America.

male sterility. 25 stocks segregated for male sterility are being studied.

New genes

1. Rh_1 Rh_1. Rough sheaths$_1$. A dominant gene producing warts in the leaf sheaths in the lower part of the leaf blade near the auricole. This character appearing in the plant in the stage of 7 to 8 leaves. The vitality of the plant is normal. Seed available.

2. rh_2 rh_2. Rough sheaths$_2$. A recessive gene producing the character similar to that of Rh_1 Rh_1. Beside warts this gene causes sometimes a narrowing of the leaf blade and the appearance of thread-like leaves. The vitality of the plant is somewhat low, but in some families normal. Seed available.

3. gl_4-gl_{11}. Glossy$_{4-11}$. 11 different allelomorphs gl_1-gl_{11} have been recorded from 25 different stocks. Among the 11 genes of glossy by intercrossing and linkage there have been found gl_1 - gl_3 previously described. The linkage of the remaining genes will be shown below.

4. cr_2 cr_2. Crinkly. A gene similar to crinkly$_1$ but non-allelomorphic with it. Seed available.

5. yg_3 yg_3-yg_4 yg_4. Yellow-green$_{3-4}$. Duplicate genes. The seedlings are yellow-green till the flowering stage. After the flowering the yellow pigment disappears. It segregated as a simple recessive gene in the original stock. In crossing with non-allied families gives 15:1. The vitality of plant is extremely low. Seed available.

6. rs-rs. Ramosa-silkless. This gene causes a branching of the ear similar in appearance to ramosa but with the complete absence of silks. At the same time it causes an, in the tassel, increasing of glums, flower spikelets and anthers in the pair spikelets. It gives a normal pollen. The vitality of the plant is normal. Seed available.

7. at at. Antherless. Causes a complete absence of anthers. The vitality of the plant is normal. Seed available.

8. hf hf. Hermaphrodite flowers. A pistilate flower is developed in the male flower beside anthers giving a silk 2-3 cm. long. Sometimes instead of a silk there is only a rudimentary pistil. The pollen is very rarely developed. The ears have a low fertility. The vitality of plant is normal.

9. vb vb. Variable brachyte. Causes a sharp shortening of the internodes up to 1 cm. This character is much variable. This shortening may affect either a considerable part of internodes in what case it produces a dwarf plant, or only a part of internodes. Very often the shortened internodes alternate with the normal. Non-allelomorphic with brachyte.

The allelomorphism of vb vb with brevis will be stated in summer 1934. Seed available."

In answer to my reply to the above letter the following was received:

"I have received your kind letter and mimeographed circulars. I am very grateful to you for information and multiple testers which you are sending me. The connection I am trying to establish with you and which, I trust, will be strengthened in future will greatly help us in our work on maize genetics, which I am carrying on now. I hope not to be soon the only worker on maize genetics in U.S.S.R. because I try incorporate into it a considerable number of persons carrying selectional work in corn inbreeding. These workers introduce up to 10-12 thousand new self pollinations every year. Without close association with you our work would be extremely difficult.

In regard to your observations on new mutation characters I am going to say the following:

1) I agree with you that Rs_1 and rs_2 are better symbols for Rough sheath$_1$ and rough sheath$_2$. I gave them symbols Rh_1 and rh_2 because by rs I have designated ramosa-silkless which, as I read shortly in the Journal of Heredity seems to be similar to 'branched silkless' bd.

2) I hope to come to an agreement with Dr. Sprague regarding the allelomorphism of Dr. Sprague and my glossies.

3) My crinkly is non-allelomorph cr_1. A limited generation of F_2 from crossing $\frac{+\ +\ cr_2}{sh\ wx\ +}$ shows that it is not located in 9 chromosomes and thus seems non-allelomorph cr_2 of Dr. Eyster. I will designate it by cr_3.

4) Genes yellow green$_{3,4}$ - duplicate genes which you think to be similar to $au_{1,2}$ of Dr. Eyster will be tested in linkage with the genes wx and C. I have these F_2.

5) My ramosa-silkless is similar to branched-silkless of Dr. Kempton. My data, however, on linkage (bd) do not coincide with those of Dr. Kempton, who believes it (bd) to be located in 4 (su-Tu) chromosome.

The table below shows my

Progeny	Phase	Genes	Number of Plants				Total	Crossover Per cent
			BdX	Bdx	bdX	bdx		
F_2	R	Susu	728	159	227	42	1156	47.6±1.53
F_2	C	Tutu	102	33	41	8	184	57.0±4.01
F_2	R	Bnbn	252	143	101	19	515	34.7±2.55
B	R	Bnbn	9	41	15	6	41	36.6

which induce me to think (bd) located in 7 (ra-gl_1) chromosome. This summer I shall have the linkage (bd) with larger progeny.

6) I have genes ts_1, ts_2, ts_4 and I am aware of the genes Ts_3. All these genes produce grains on tassels and in ts_1, ts_2, ts_4 there is nearly always a complete replacement of male flowers by female. Ts_3 produces also grain on the tassel. A small ovary with a sport silk or without it is developed in the hermaphrodite male flowers in which seeds are never formed. Anthers are nearly normal, but pollen degeneration occurs soon after tetrads during the formation of pollen walls. hf is associated with a strong sterility of female flowers, hf - is not linked with su. I have sent you the drawings of hf male flowers.

At the same time I am sending you small quantity of seed Rs_1, rs_2, cr_3, at, hf, vb, bd, ra and my gl_2, gl_3, gl_5, gl_6, gl_7, gl_8, gl_9, gl_{10}. In autumn I will forward a series of characters after testing their mode of heredity.

Some time ago I read your paper on plasmatic sterility in the Journal of Genetics. The results which I obtained and mentioned at the time in my letter to Dr. Karpetchenko, then in Pasadena, are completely identical with yours. The experiments with artificial infection of seedlings by fresh juice from flowering ears showed me, as in your case, negative results. I am, however, inclined to consider this phenomenon as a result occasioned by the virus diseases. Presently in connection with investigations of the Mendelian type of male sterility from 35 different sources I came upon 4 cases of plasmatic sterility. One type of plasmatic sterility inherited in F_1 through pollen I have in sorghum. I am studying it presently. In regard to the work of the Mendelian type of male-sterility I have got myself in connection with Dr. Beadle, through whose kindness I received all his genes of male sterility.

With best wishes, I am

Sincerely yours,

(signed) M. I. Hadjinov."

Unfortunately the seed Hodjinov sent was received too late for planting here at Ithaca last summer. Next fall, however, we shall have seed available for distribution.

Corrections and additions to list of genetic factors
(See maize letter of January 23, 1933)

at (antherless) Hadjinov

ag (argostripe) is allelomorphic with ij (iojap).

The symbol bd is for branched silkless. The character branched sterile is non-existent.

be (branched ear) proved from tests made this summer to be allelomorphic with bd.

bn_2 (brown aleurone) is in chromosome 3. Sprague.

cr_3 (crinkly leaves). Hadjinov.

d_7 (dwarf plant) is in chromosome 10. Singh.

Da_2 (dominant aleurone diluter). In chromosome 9, 6 units from C. Order is Da_2-c-wx. Eyster.

dl (dull brown endosperm blotch). Singleton and Jones.

dm (dead leaf margins). Kempton '23.

fl_2 (floury endosperm). Mumm.

gl_{10} (glossy seedling). In chromosome 1. Emerson.

gs_2 (green striped). In chromosome 2. Sprague.

hf (hermaphroditic flowers). Hadjinov.

j_2 (japonica). In chromosome 4. Emerson.

le (lemon endosperm). In chromosome 5. Eyster.

lo (lethal ovule) may be allelomorphic with sp. In chromosome 4. Singleton '32.

me (mealy endosperm). Mangelsdorf '22.

o_3 (opaque endosperm). Chromosome 9. Eyster.

pb_5 (piebald). Apparently non existent.

pe (pubescens-hairy sheath). Tavcar '32.

Pl (purple plant color). Chromosome 6. Emerson '21.

pm (pale midrib). Chromosome 2. Brink.

ps (panicula specialis). Tavcar '31.

ra_2 (ramosa). Brink.

re_1 (reduced endosperm). Chromosome 5. Eyster '31.

re_2 (reduced endosperm) chromosome 5. Eyster '31.

rc_4 (reduced endosperm). Chromosome 4.

Rs_1 (rough sheath - dominant). Hadjinov.

rs_2 (rough sheath - recessive). Hadjinov.

Rw_1, etc. (row number genes). Tavcar.

si_2 (silky) (si_2 and si_3 are duplicate genes). Fraser.

si_3 (silky). Fraser.

su^{am} (an allelomorph of su). Mangelsdorf.

w_{18} (white seedling). Chromosome 4. Lindstrom.

ws_3 (white sheath). Rhoades.

yf (yellow flecked leaves). Chromosome 9. Eyster.

zg_2 (siz zag stalk). Chromosome 6. Singh.

Please add these to the list in the maize letter of January 23, 1933. We would appreciate it if you would notify us of any mistakes, oversights, etc. Notify this office of any new symbols you may wish to use before publishing so that we can help avoid duplication of symbols.

List of maize geneticists

Anderson, E. G., Institute of Technology, Pasadena, Calif.
Beadle, G. W., Institute of Technology, Pasadena, Calif.
Brink, R. A., Genetics Dept., Univ. of Wisconsin, Madison, Wisc.
Burnham, C. R., Agronomy Dept., Univ. of W. Va., Morgantown, W. Va.
Clokey, Ira M., 1635 Laurel St., S. Pasadena, Calif.
Collins, G. N., Bureau of Plant Industry, U.S.D.A., Washington, D.C.
Cooper, D. C., University of Wisconsin, Madison, Wisc.
Creighton, Miss H. B., Conn. College for Women, New London, Conn.
Demerec, M., Carnegie Inst., Cold Spring Harbor, Long Island, N.Y.
Emerson, R. A., Plant Breeding Dept., Cornell Univ., Ithaca, N.Y.
Eyster, W. H., Botany Dept., Bucknell University, Lewisburg, Pa.
Fraser, A. C., Plant Breeding Dept., Cornell Univ., Ithaca, N.Y.
Gurney, H. C., Waite Research Inst., Adelaide Univ., Adelaide, Aust.
Hadjinov, M. I., Inst. Plant Industry, Detskoe Selo (near Leningrad), U.S.S.R.
Hayes, H. K., Agronomy Dept., University Farm, St. Paul, Minn.
Hull, Fred, Agronomy Dept., Agric. Exp. Station, Gainesville, Fla.
Jenkins, M. T., Bureau of Plant Industry, U.S.D.A., Washington, D.C.
Jones, D. F., Genetics Dept., Agric. Exp. Sta., New Haven, Conn.
Kempton, J. H., Bureau of Plant Industry, U.S.D.A., Washington, D.C.
Kvakan, Paul, Dobricevo Cuprija, Jugoslavia.
Li, H. W., Honan University, Kaifeng, Honan, China.
Lindstrom, E. W., Genetics Dept., Iowa State College, Ames, Iowa.
McClintock, Miss Barbara, Plant Breeding Dept., Cornell University, Ithaca, N.Y.
Mangelsdorf, P. C., Agronomy Dept., Agric. Exp. Station, College Station, Texas.
Meyers, M. T., Farm Crops Dept., Ohio State Univ., Columbus, Ohio.
Mumm, W. J., Agronomy Dept., Univ. of Illinois, Urbana, Ill.
Perry, H. S., Botany Dept., Duke Univ., Durham, N. Car.
Randolph, L. F., Botany Dept., Cornell University, Ithaca, N.Y.
Reeves, R. G., Biology Dept., Agric. Exp. Sta., College Station, Tex.
Rhoades, M. M., Plant Breeding Dept., Cornell Univ., Ithaca, N.Y.
Rhoades, V. H., Botany Dept., Cornell University, Ithaca, N.Y.
Singh, S., Plant Breeding Dept., Cornell University, Ithaca, N.Y.
Singleton, W. R., Genetics Dept., Agric. Exp. Sta., New Haven, Conn.
Sprague, G. F., Bureau of Plant Industry, U.S.D.A., Washington, D.C.
Stadler, L. J., Field Crops Dept., Univ. of Missouri, Columbia, Mo.
Tavcar, A., Dept. of Plant-Breeding, Univ. of Zagreb, Zagreb, Jugosl.
Thomas, H. C., Genetics Dept., University Farm, St. Paul, Minn.
Weatherwax, Paul, University of Indiana, Bloomington, Ind.
Wentz, J. B., Farm Crops Dept., Iowa State College, Ames, Iowa.

In addition to the preceding list the maize letters are sent to the following individuals who have requested that they be included on the mailing list. Some of them have been active in the past in corn genetics but have in recent years become inactive. Others on the list are anxious to receive the letters so that they may closely follow the progress of corn genetics.

Anderson, Edgar, Bussey Inst., Harvard University, Cambridge, Mass.
Brieger, Friedrich, John Innes Hort. Inst., Merton, London, England
Brunson, A. M., Agronomy Dept., Kansas State College, Manhattan, Kansas.
Down, E. E., Farm Crops Dept., Michigan State College, East Lansing, Michigan.
Dorsey, E., Plant Breeding Dept., Cornell Univ., Ithaca, N.Y.
Garber, R. J., Agronomy Dept., Univ. of W. Va., Morgantown, W. Va.
Hays, F. A., Poultry Husbandry Dept., Mass. State College, Amherst, Mass.
Hofmeyr, J. D. J., P.O. Marabastad, Pietersburg, South Africa.
Hoover, M. M., Agronomy Dept., Univ. of W. Va., Morganton, W. Va.
Horovitz, S., Univ. of Buenos Aires, Buenos Aires, Argentina.
Krug, C. A., Inst. Agronomica do Estado Campinas, Sao Paulo, Brazil
Kuleshov, N. N., Inst. Applied Botany, Herzen St. 44, Leningrad, U.S.S.R.
Lebedeff, G. F., Carnegie Inst., Cold Spring Harbor, Long Island, N
Mains, E. B., Botany Dept., Univ. of Michigan, Ann Arbor, Mich.
Miles, L. G., Agric. Dept., Queensland Univ., Brisbane, Australia.
Neal, Norman P., Genetics Dept., Univ. of Wisconsin, Madison, Wisc.
Phipps, Ivan F., Waite Research Inst., Adelaide Univ., Adelaide, Australia.
Richey, F. D., Assoc. Chief, Bureau of Plant Industry, U.S.D.A. Washington, D. C.
Sharp, L. W., Botany Dept., Cornell Univ., Ithaca, N.Y.
Taboada, E. R., Direccion Gral. de Agric., Sn. Jacinto, Mexico.
Wiggans, R. G., Plant Breeding Dept., Cornell Univ., Ithaca, N.Y.

Do not forget that the dead line for receipt of news items is November 15th. Please cooperate so that we can make these maize letters of real service and interest to you.

Sincerely yours,

M. M. Rhoades

MMR:B

M. M. Rhoades